Clinical Case Report

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Non-Hodgkin lymphoma of multiple extranodal involvement seen on MRI, FDG PET–CT scans

A case report

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Abstract

Rationale: Anaplastic large cell lymphoma (ALCL) is a rare type of non-Hodgkin lymphoma (NHL). The most common extranodal sites of ALCL are skin, subcutaneous tissue, bone, lung, and gastrointestinal organs. This study reports a case of ALCL with multiple extranodal involvement, especially the whole body skeletal muscles, with the aim to share the imaging features of the ALCL including magnetic resonance imaging (MRI) and 18F-fluorodeoxyglucose positron emission tomography-computed tomography (18F-FDG PET-CT).

Patient concerns: A 54-year-old female patient presented with two-month history of bilateral shoulder pain, which had exacerbated for 6 days prior to admission. MRI scans revealed multiple hyperintense on T2-weighted image (T2WI) and marked inhomogenous diffuse or rim enhancement masses in shoulder muscles. The probable diagnoses must include metastatic carcinoma in the skeletal muscle, purulent abscess, soft-tissue sarcoma and lymphoma. For our patient, however, she did not have a history of cancer or hyperleukocytosis. 18F-FDG PET-CT was made for further evaluation and identified whether there is another related lesion. PET-CT image showed widespread FDG uptake lesions, including cervical/retroperitoneal lymphnodes, subcutaneous tissue, hepar and multiple groups of whole body muscles.

Diagnoses: An ultrasound-guided tissue biopsy was performed on the left cervical lymphnodes. Histological and immunohistochemical examination showed ALK- ALCL.

Interventions: Clinicians planned to give our patient systemic chemotherapy.

Outcomes: Our patient died of multiple organ failure four weeks after her first visit to our hospital.

Lessons: This disease should be considered when patient presented diffuse muscle swelling in particular when a history of cancer and hyperleukocytosis was not supported. The presence of soft tissue masses in skeletal muscles on MRI scans, as well as multiple marked focal tracer uptake on PET-CT and immunohistochemical analysis of the mass, may help the recognition of ALCL and the state of illness evaluation, allowing for the appropriate treatment strategy to be initiated.

Abbreviations: ^{18}F-FDG PET–CT = ^{18}F-fluorodeoxyglucose positron emission tomography–computed tomography, ALCL = anaplastic large cell lymphoma, ALK = anaplastic lymphoma kinase, MIP = maximum intensity projection, MRI = magnetic resonance imaging, T2WI = T2-weighted image.

Keywords: ^{18}F-FDG PET–CT, anaplastic large cell lymphoma, CD30, extranodal involvement, MRI

1. Introduction

Anaplastic large cell lymphoma (ALCL) is a high grade non-Hodgkin lymphoma that is comprised of the malignant proliferation of large lymphoid cells, which expresses CD30.[1] The expression of the anaplastic lymphoma kinase (ALK) protein is the main characteristic used to classify ALCLs into 2 different systemic forms, which includes the ALK-positive (ALK+) and ALK-negative (ALK−) tumors.[2–4] The median age of ALK− ALCL patients is about 58 years old, which is approximately 2 decades older than that of patients with ALK+ ALCL. ALK− ALCL is more clinically aggressive and predominantly occurs as advanced-stage disease in older patients.[3] It has been reported that ALK+ ALCLs exhibit a predominance for the involvement of bone, bone marrow, and subcutaneous tissues whereas ALK− ALCLs are more likely to invade the liver and the gastrointestinal tract.[4] Extranodal involvement of skeletal muscles in ALCLs is extremely rare.[5] Here, we present a rare case of ALK− ALCL of multiple extranodal involvement, especially the whole body skeletal muscles, with the aim to share the imaging features of the ALCL including magnetic resonance imaging (MRI) and ^{18}F-fluorodeoxyglucose positron emission tomography–computed tomography (^{18}F-FDG PET–CT). Imaging findings from a review of relevant literature are presented. Clinicians and pathologists should keep in mind the possibility of the ALCL when multiple

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SW and MM have contributed equally to this work.

The authors report no conflicts of interest.

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lesions involved, with soft tissue masses in skeletal muscles on MRI and abnormally intense radioisotope uptaking on ^{18}F-FDG PET–CT.

2. Case report

2.1. Ethical review and patient consent

It is not necessary to achieve ethical approval for this case report and this report requires obtaining patient consent because this study is dealt with only the patient's medical record and related images, retrospectively. Consent of this case report was obtained from the patient.

2.2. Case

A 54-year-old female patient presented with 2-month history of bilateral shoulder pain, which had exacerbated for 6 days prior to admission. Her shoulder muscles were diffuse swelling with obviously tenderness. Laboratory investigation showed normal white blood cell count (3.5×10^9 cells/L: neutrophils, 69.0%; lymphocytes, 21.9%; and monocytes 6.0%), erythrocyte sedimentation rate (5 mm/h; normal value, <20 mm/h), C-reactive protein concentration (6.75 mg/dL; normal value, <0.30 mg/dL), and all the female tumor markers were normal. MRI scans (Fig. 1A and B) revealed multiple hyperintense on T2-weighted image (T2WI) and homogeneous low or iso signal intensity on T1-weighted image. After intravenous administration of contrast medium (Fig. 1C–E), shoulder muscles including pectoralis major, deltoid, biceps brachii, triceps brachii, teres major presented multiple marked inhomogeneous or rim enhancement masses. The probable diagnoses must include metastatic carcinoma in the skeletal muscle, purulent abscess, soft-tissue sarcoma, and lymphoma. For our patient, however, she did not have a history of cancer and hyperleukocytosis. ^{18}F-FDG PET–CT was made for further evaluation and identified whether there were another related lesions. The whole body maximum intensity projection PET image (Fig. 2A and B) showed widespread FDG uptake lesions. The fused PET–CT image showed increased FDG uptake in cervical/retroperitoneal lymph nodes (Fig. 3A and D), subcutaneous tissue (Fig. 3E and F), hepar (Fig. 3D), and multiple groups of whole body muscles (Fig. 3A–G), including splenius capitis, sternocleidomastoid, pectoralis major, pectoralis minor, trapezius, rhomboid, infraspinatus, biceps brachii, triceps brachii, rectus abdominis, psoas major, gluteus maximus, vastus

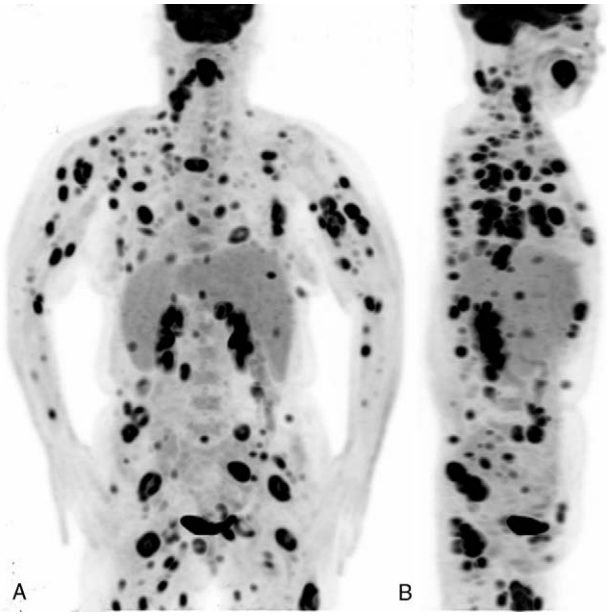

Figure 2. The 3D MIP image in coronal (A) and sagittal (B) plane demonstrated widespread fluorodeoxyglucose uptake lesions. MIP = maximum intensity projection.

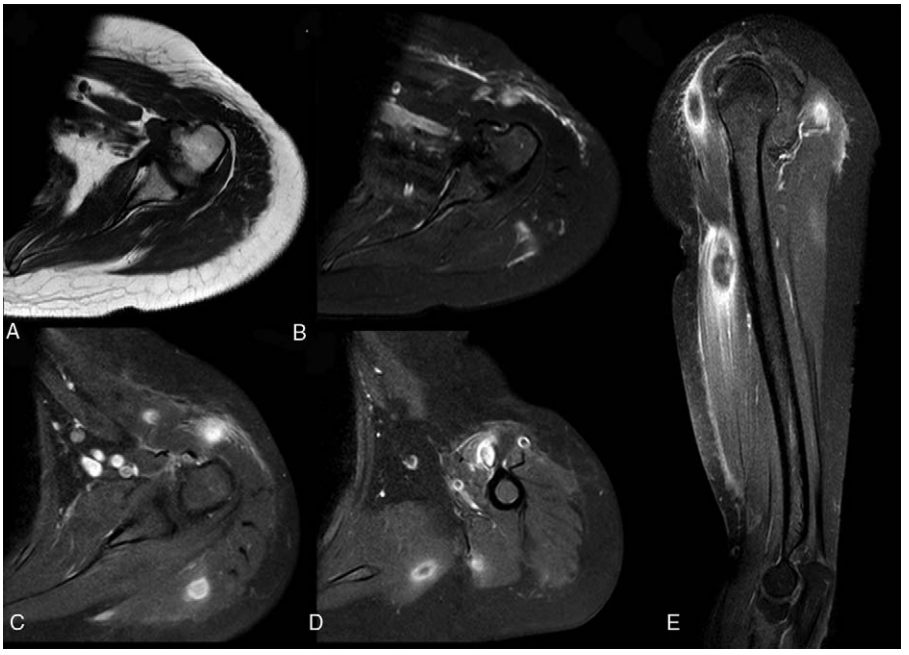

Figure 1. Magnetic resonance imaging of the tumors. (A) A T1-weighted axial magnetic resonance imaging scan showed iso signal intensity. (B) A T2-weighted axial magnetic resonance imaging scan revealed multiple hyperintense. (C–E) Axial and sagittal fat-suppressed contrast-enhanced T1-weighted images identified marked inhomogeneous or rim enhancement mass in pectoralis major, deltoid, biceps brachii, triceps brachii, and teres major muscles.

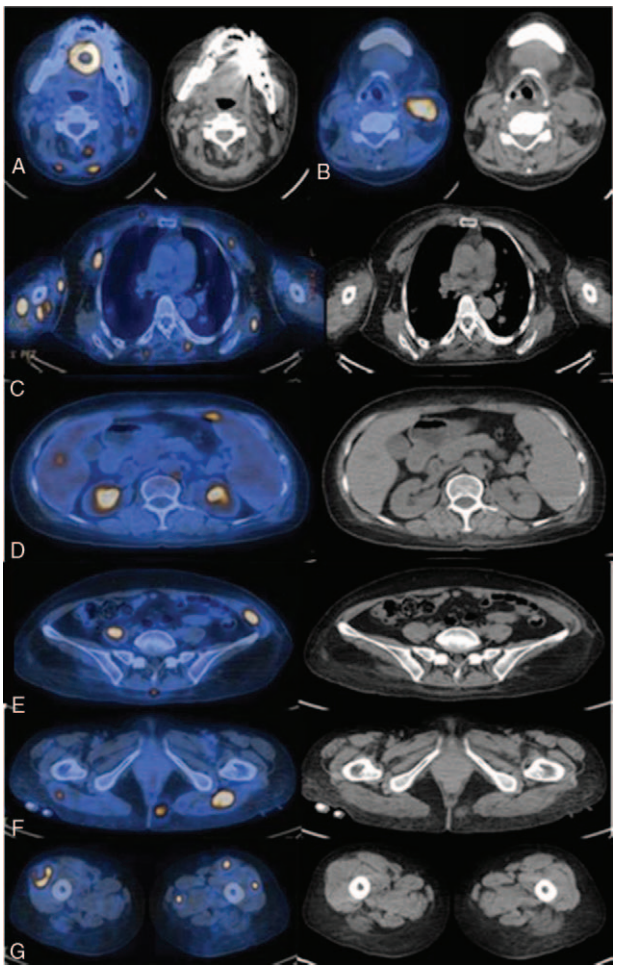

Figure 3. Selected trans axial slices of fused PET–CT and attenuation-corrected computed tomography images showed abnormal focal fluorodeoxyglucose uptake in multiple groups of whole body muscles (A–G), cervical/retroperitoneal lymph nodes (A, D), hepar (D), and subcutaneous tissue (E, F). PET–CT = positron emission tomography–computed tomography.

lateralis, rectus femoris, adductor magnus, etc. For pathological examination, ultrasonography-guided tissue biopsy was performed on the left cervical lymph nodes. Histological examination of the biopsy sample showed large, atypical, pleomorphic cells with prominent nucleoli and pathological mitotic figures (Fig. 4A). Immunohistochemical examination revealed that the tumor cells were positive for EMA (Fig. 4B), VIM (Fig. 4D), CD30 (Fig. 4E), partially positive for CD43 (Fig. 4I), TIA-1 (Fig. 4J) and 80% Ki-67 positive (Fig. 4C), but were negative for ALK (Fig. 4F), CD20 (Fig. 4G), and CD34 (Fig. 4H). Therefore, the patient was diagnosed with ALK− ALCL at stage IV of the disease according to the Ann Arbor classification.[6] Subsequently, clinicians planned to give our patient systemic chemotherapy. However, her general condition rapidly deteriorated. Unfortunately, our patient died of multiple organ failure 4 weeks after her first visit to our hospital and similar survival of such cases has been reported previously.[4,5]

3. Discussion

ALCL was first described by Stein et al in 1985 as pleomorphic large cell lymphoma with a strong expression of the cytokine receptor CD30.[7] ALK− ALCL should be distinguished from other ALCL types, due to the different clinical features, treatment outcomes, and immunophenotypic and genetic markers used for the diagnosis of the disease.[4] Patients with ALK-negative ALCL have worse prognosis compared with ALK-positive patients (5-year overall survival: 33–49% and 70–80%, respectively).[8] This poor prognosis is presented in our case.

Lymphoma may arise from or involve almost any organ of human body.[9] The term extranodal has been used to describe an uncommon form of lymphoid malignancy, in which there is neoplastic proliferation at sites other than the expected native lymph nodes or lymphoid tissues.[10] The most common extranodal sites of ALCL are the skin, subcutaneous tissue, bone marrow, bone, lung, and gastrointestinal organs.[11] Lesions with multiple extranodal involvement, especially the skeletal muscles are extremely rare in ALCL. Some reporters have reported cases of ALK− ALCL with extranodal involvement of the skeletal muscles.[5,11,12]

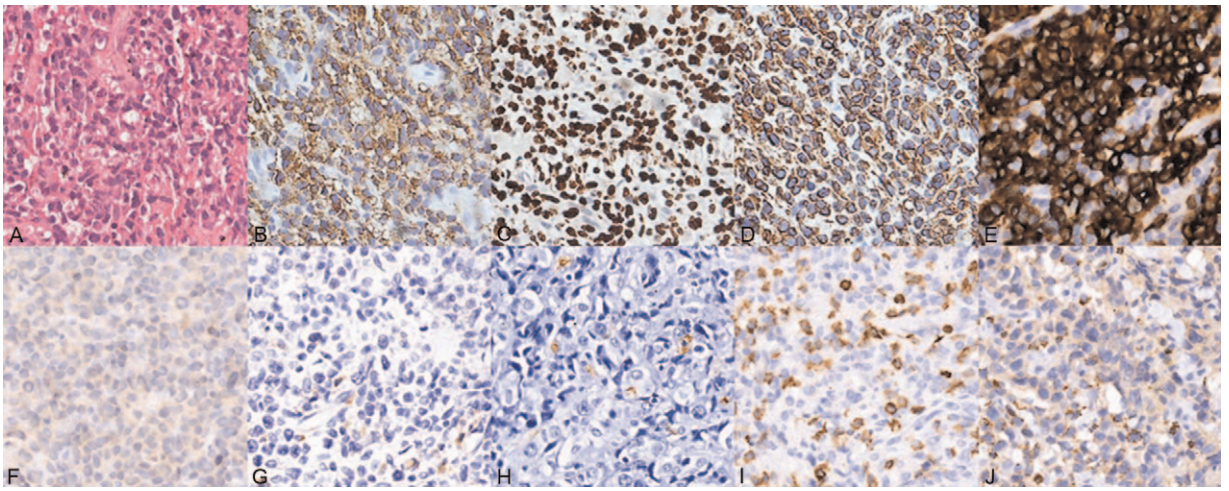

Figure 4. Histological examination of the tumor. (A) Hematoxylin and eosin stain (×400) of the lesion revealed large, atypical, pleomorphic cells with prominent nucleoli and pathological mitosis. Immunohistochemical examination (×400) revealed that the tumor cells were positive for EMA (B), VIM (D), CD30 (E), partially positive for CD43 (I), TIA-1 (J) and 80% Ki-67 positive (C), but were negative for ALK (F), CD20 (G), and CD34 (H).

The role of imaging studies in the diagnosis and treatment of muscle lymphoma has been discussed in various reports.[13–15] MRI is currently the most preferred method for the characterization of soft-tissue tumors. Lymphomas with muscle involvement have been reported to have similar signal intensity to muscles or hyperintense versus the unaffected musculature on T1-weighted image (T1WI), in addition, hyperintense on T2WI.[13,16] After intravenous administration of contrast medium, Chun et al[16] found that the identified lesions had homogeneous diffuse enhancement in 68%, predominantly peripheral thick band-like enhancement in 21%, and marginal septal enhancement in 11%. In this case, our patient showed multiple hyperintense on T2WI, isointense on T1WI, inhomogeneous diffuse or rim enhancement soft-tissue masses. PET–CT added information on the metabolic activity of lesions and identified whole body-related lesions. With ^{18}F-FDG PET, it demonstrated multiple marked focal tracer uptake. PET–CT could find more focus which performed negative in MRI because metabolism of active lesions may not have morphological changes.[17] In addition, uptake levels seem to correlate with the grade of malignancy of muscle lymphoma.[18,19] However, a biopsy is imperative for a final and conclusive diagnosis.

In conclusion, we present a case of ALK− ALCL with multiple extranodal involvement, especially the whole body skeletal muscles. This disease should be considered when patient presented diffuse muscle swelling in particular when a history of cancer and hyperleukocytosis was not supported. We emphasize that a multidisciplinary team approach with clinicians, radiologists, and pathologists is essential for proper diagnosis, staging, and management of such rare lesion.

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